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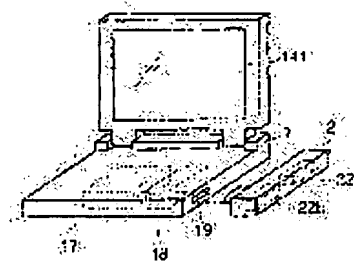
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(54) ELECTRONIC EQUIPMENT, FUEL TANK UNIT, AND METHOD OF CONTROLLING POWER SUPPLY FOR ELECTRONIC EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electronic equipment to which a fuel tank unit storing the fuel of a built-in fuel cell can be externally connected.

SOLUTION: The main body of the electronic equipment 1 includes a DMFC (direct methanol fuel cell) unit 17 where methanol given as the fuel is reacted with oxygen to obtain electric energy, and also houses a cartridge type fuel tank 18 storing methanol to be the fuel for this DMFC unit 17. Further, this main body is provided with an attachment (connecting part) 19 to which the external fuel tank unit 2 storing large quantities of methanol to be the fuel of the DMFC unit 17 can be connected, if necessary, and fuel tanks 22a, 22b of the same shape are detachably and attachable mounted in this external fuel tank unit 2.



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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION
TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to the power control approach of the electronic equipment which builds a fuel cell in a body, a fuel tank unit connectable with the peripheral wall of this body case, and this device.

[0002]

[Description of the Prior Art]

The electronic equipment of the pocket mold which can drive a Personal Digital Assistant, a digital camera, etc. which are called recent years (Personal Digital Assistant), for example, PDA etc., with a dc-battery is developed variously, and has spread widely.

[0003]

Moreover, attention with a big environmental problem is attracted and dc-battery development which considered the environment is also performed briskly recently. And the direct methanol mold fuel cell (following and DMFC:Direct Methanol Fuel Cell) is well known as this kind of a dc-battery.

[0004]

This DMFC makes the methanol and oxygen which are given as a fuel react, electrical energy is obtained by that chemical reaction, and two electrodes which consist of porous metal or carbon have the structure which sandwiched the electrolyte (for example, nonpatent literature 1 reference). And in order for this DMFC not to generate an obnoxious waste, application on electronic equipment which was mentioned above is called for strongly.

[0005]

[Nonpatent literature 1]

Hiroyuki Ikeda assistant work Nippon Jitsugyo Publishing Co., Ltd. of "everything about fuel cells", August 20, 2001, p216-217

[0006]

[Problem(s) to be Solved by the Invention]

By the way, the amount of this DMFC which can be generated is proportional to the amount of a fuel which can be consumed. Therefore, in order to carry out a long duration drive, it is required to carry a fuel tank with big capacity. Therefore, when DMFC was built in the personal computer of a note type, there was a problem of also causing the increment in the volume of that body of a personal computer, with large-scale-izing of this fuel tank.

[0007]

This invention is made in consideration of such a situation, and aims at offering the power control approach of this device of performing various setup about use of the fuel tank unit and two or more fuel tanks which can detach and attach freely the fuel tank unit which stored the fuel to the electronic equipment in which external connection is possible, and this device.

[0008]

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, the electronic equipment of this invention is characterized by providing the 1st fuel tank which stores the fuel of a body, the fuel cell built in said body, and said fuel cell built in said body, and the 2nd fuel tank which is established in said body case free [attachment and detachment],

and stores the fuel of said fuel cell.

[0009]

Moreover, the electronic equipment of this invention is characterized by providing a connection connectable with the peripheral wall of said body case for the fuel tank unit which can contain a body, the fuel cell built in said body, and the 2nd fuel tank which it is prepared in said body, and the 1st fuel tank which stores the fuel of said fuel cell is prepared by the stowage which can be contained inside said body, and said body, and stores the fuel of said fuel cell.

[0010]

Moreover, the electronic equipment of this invention is characterized by the body, the fuel cell built in said body, and being prepared in said body, and for the fuel tank which stores the fuel of said fuel cell being prepared by the stowage which can be contained inside said body, and said body, and providing a connection connectable with the peripheral wall of said body for the fuel tank unit which can contain said fuel tank.

[0011]

Moreover, the fuel cell with which the electronic equipment of this invention is built in a body and said body, The 1st fuel tank which is established in said body and stores the fuel of said fuel cell The stowage which can be contained inside said body, The 1st acquisition section which acquires the data in which the busy condition of said 1st fuel tank is shown, The 2nd fuel tank which is established in said body case free [attachment and detachment], and stores the fuel of said fuel cell, It is characterized by providing the display which displays the busy condition of said 1st fuel tank acquired by the 2nd acquisition section which acquires the data in which the busy condition of said 2nd fuel tank is shown, said 1st acquisition section, and said 2nd acquisition section, and said 2nd fuel tank.

[0012]

Moreover, the fuel tank unit of this invention is characterized by providing the connector for connecting with the body which contains a fuel cell, and the fuel tank slot which can contain the fuel tank which stores the fuel of said fuel cell.

[0013]

Moreover, the power control approach of the electronic equipment this invention The step which acquires the data in which the busy condition of the 1st fuel tank which stores the fuel of said fuel cell which is the power control approach of the electronic equipment which built the fuel cell in the body, and was contained inside said body is shown, The step which acquires the data in which the busy condition of the 2nd fuel tank which stores the fuel of said fuel cell contained by the fuel tank unit connected to the peripheral wall of said body is shown, The step which carries out a screen display of the busy condition of said 1st fuel tank shown by said each acquired data, and said 2nd fuel tank, It is characterized by providing the step which performs various setup about use of said 1st fuel tank and said 2nd fuel tank according to the actuation on said displayed screen.

[0014]

According to these invention, the thing [that sometimes come out and only a required part attaches a fuel] becomes possible by being able to inhibit the increment in the volume of the electronic equipment in the case of building in a fuel cell, and preparing two or more slots which can contain a fuel tank in a fuel tank unit by having enabled external connection of the fuel tank unit which stores the fuel of a fuel cell if needed.

[0015]

[Embodiment of the Invention]

Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0016]

Drawing 1 is drawing showing the appearance of the electronic equipment concerning the operation gestalt of this invention.

[0017]

this electronic equipment 1 -- carrying -- it is the personal computer of an easy note type, and LCD (Liquid Crystal Display)141 is arranged at the inside of the free-wheel-plate section attached in the body section free [closing motion]. The fuel tank 18 of the cartridge-type which the DMFC unit 17 which the methanol and oxygen which are given as a fuel are made to react to the body section on the other hand, and obtains electrical energy is built in, and stores the methanol which is the fuel of this DMFC unit 17 is contained.

[0018]

Furthermore, the external fuel tank unit 2 which stores the methanol which is the fuel of the DMFC unit 17 in large quantities is formed in the attachment (connection) 19 which can connect by this body section if needed. This external fuel tank unit 2 can equip now with the fuel tanks 22a and 22b of the same configuration free [pulling out].

[0019]

That is, this electronic equipment 1 making it unnecessary to carry the fuel tank which has big capacity by considering the external fuel tank unit 2 as the configuration in which external connection is possible in body circles in building in the DMFC unit 17, it enables a generation of electrical energy in the DMFC unit 17 of long duration by making the external fuel tank unit 2 connectable if needed, and enables the long duration drive of electronic equipment 1. I hear that the increment in the volume of the body section of saying [making it unnecessary to carry a fuel tank with big capacity in body circles / 1], i.e., electronic equipment, is inhibited, and it is.

[0020]

about 20 [for example,] -- in the case of about W mobile PC, the drive of about about 2 - 3 hours is possible by holding about 50 cc fuel tank in the interior. Although the usual use is enough, it is insufficient when carrying out a last date dc-battery drive, for example by business trip etc. In such a case, if the about 250 cc external fuel tank unit 2 is added, for example (fuel tanks 22a and 22b are about 125 cc respectively), the drive of about about 13 - 16 hours will be guaranteed, and it will become possible to carry out a long duration drive without an AC adapter or a dc-battery.

[0021]

Moreover, since this external fuel tank unit 2 can equip with fuel tanks 22a and 22b free [pulling out], the usage according to that situation when saying that it equips only with one side at a certain time, and both equip at a certain time of it becomes possible.

[0022]

By the way, although drawing 1 showed the example which attaches the external fuel tank unit 2 in the left lateral of the body case of electronic equipment 1, it is not restricted to this. For example, you may make it attach in the tooth back of the body case of electronic equipment 1, and may make it attach in the base of a body case, as shown in drawing 2 . Moreover, it is good also as or more two installation to coincidence being possible in this external fuel tank unit 2.

[0023]

Moreover, the fuel tank 18 contained inside a body has about 50 cc capacity, and although the fuel tanks 22a and 22b with which the external fuel tank unit 2 is equipped showed the twice [more than] as many example which has about 125 cc capacity respectively as a fuel tank 18, you may make it the external fuel tank unit 2 equip with two or more fuel tanks 18 similarly in previous explanation. For example, it is suitable when a fuel tank is standardized.

[0024]

Drawing 3 is drawing showing the outline configuration of this electronic equipment 1 and the external fuel tank unit 2.

[0025]

As shown in drawing 3 , as for electronic equipment 1, CPU11, RAM12, HDD13, the front display controller 14, the keyboard controller 15, and the power-source controller 16 are connected to a system bus. Moreover, electronic equipment 1 contains the fuel tank 18 which stores the methanol which is the fuel of this DMFC unit 17 while building in the DMFC unit 17 as a dc-battery. Furthermore, the connection 19 for making external connection of the external fuel tank unit 2 if needed is formed in this electronic equipment 1.

[0026]

CPU11 manages the motion control of this electronic equipment 1 whole, and performs various programs, such as an operating system stored in RAM12, BIOS (Basic Input/Output System), utility software, and application software. The power-source management utility mentioned later is one in two or more utility software.

[0027]

RAM12 is a memory device which stores the various data used by the various programs performed by CPU11, or these programs. On the other hand, HDD13 is a non-volatile memory device which stores various programs and various data in large quantities. After the data memorized by HDD13 are read by the directions from

CPU11 and copied to RAM12, they are performed by CPU11.

[0028]

A display controller 14 is equipment which bears the output side of the user interface which this electronic equipment 1 offers, and does the display control of the screen data processed by CPU11 to LCD141. On the other hand, the keyboard controller 15 is equipment which bears the input side of the user interface which this electronic equipment 1 offers, evaluates actuation of a keyboard 151 and a mouse 152, and transmits it to CPU11 through a built-in register.

[0029]

The power-source controller 16 rations the power for actuation to each part of this electronic equipment 1, and carries out drive control of the DMFC unit 17. Moreover, the power-source controller 16 has the setting register for performing various setup about use of two or more fuel tanks, and updates the set point based on the directions from a power-source management utility. The status information which shows the condition of the DMFC unit 17 and the external fuel tank unit 2 to this setting register 161 can also be stored, and a power-source management utility can know now the condition of the DMFC unit 17 and the external fuel tank unit 2 by referring to this status information.

[0030]

The DMFC unit 17 by which drive control is carried out by the power-source controller 16 has the microcomputer 171 (only henceforth a microcomputer 171) with a built-in fuel cell unit, the DMFC cel stack 172, the rechargeable battery 175, and DC to DC converter 176.

[0031]

A microcomputer 171 manages the motion control of this DMFC unit 17 whole, and controls the amount of the fuel sent into the DMFC cel stack 172 from a fuel tank 18 by the liquid-sending pump. Moreover, while reading the residue of a fuel tank 18 from E2PROM181 which a fuel tank 18 contains, the residue memorized by E2PROM181 is subtracted according to the operating condition. Moreover, the microcomputer 171 has the function which communicates between the power-source controller 16 and the microcomputer 21 for external fuel tank units mentioned later.

[0032]

The DMFC cel stack 172 makes the methanol held in the fuel tank 18, and the oxygen sent with the ventilation pump 174 react, and makes the power for actuation of electronic equipment 1. A methanol is sent into a mixing tank 173 with the liquid-sending pump 177 from a fuel tank 18. The methanol sent in from the fuel tank 18 and the water generated in the chemical reaction in the DMFC cel stack 172 flow back, it is sent into a mixing tank 173, and a methanol is diluted with a mixing tank 173 by about 3 to 6% of concentration. Further, from a mixing tank 173, this diluted meta-NOSU reacts with the air which is sent into the DMFC cel stack 172 and sent in with the ventilation pump 174 in the DMFC cel stack 172, and generates electricity. Moreover, a part of power made at this time is supplied also to a rechargeable battery 175, and charge of a rechargeable battery is performed.

[0033]

A rechargeable battery 175 is a lithium ion battery in which repeat charge and discharge are possible, and accumulates and outputs power for a liquid-sending pump to operate. And DC to DC converter 1746 transforms the power of this rechargeable battery 175 into the electrical potential difference suitable for the liquid-sending pumps 211 and 212.

[0034]

The fuel tank 18 has the configuration of the cartridge-type which can be contained inside the body of electronic equipment 1, and as mentioned above, it has accessible E2PROM181 from the microcomputer 171. The residue of ***** is recorded on this E2PROM181 at the time of intact.

[0035]

On the other hand, the external fuel tank unit 2 in which external connection is made by the connection 19 has the microcomputer 21 (only henceforth a microcomputer 21) for external fuel tank units, and sends a fuel into the fuel tank 18 inside a body from the fuel tanks 22a and 22b with which it is equipped free [pulling out] by driving the liquid-sending pumps 211 and 212 with this microcomputer 21. Moreover, a microcomputer 21 subtracts the residue memorized by E2PROM181 according to the operating condition while reading the residue of fuel tanks 22a and 22b from E2PROM221 which each builds in. Furthermore, the microcomputer 21 has the

function which communicates between the microcomputers 171 of the DMFC unit 17.

[0036]

Fuel tanks 22a and 22b have the configuration of the cartridge-type with which the external fuel tank unit 2 can be equipped, and as mentioned above, they have accessible E2PROM221 respectively from the microcomputer 21. The residue of ***** is recorded on this E2PROM221 at the time of intact.

[0037]

That is, the residue of the fuel tanks 22a and 22b with which the external fuel cell unit 2 was equipped is recorded on each E2PROM221 by control of a microcomputer 21, and is transmitted to a microcomputer 171 by communication link. Moreover, the residue of the fuel tank 18 contained inside the body of electronic equipment 1 is recorded on E2PROM181 by control of this microcomputer 171. And a microcomputer 171 transmits the residue of the fuel tanks 22a and 22b obtained by the communication link with a microcomputer 21, and the residue of the fuel tank 18 recorded on E2PROM181 to the power-source controller 16 by communication link. On the other hand, the power-source controller 16 which received this notice stores that value in the setting register 161. Thereby, a power-source management utility can grasp now the residue of a fuel with the usable DMFC unit 17 integrative.

[0038]

In addition, although drawing 3 explained the example which sends the fuel of the fuel tanks 22a and 22b with which the external fuel tank unit 2 is equipped into the fuel tank 18 contained inside the body of electronic equipment 1 with the liquid-sending pumps 211 and 212, as it replaces with this, for example, is shown in drawing 4, a liquid-sending path may be constituted so that the fuel of fuel tanks 22a and 22b may be sent into a mixing tank 173, without minding a fuel tank 18.

[0039]

As mentioned above, the power-source management utility where the DMFC unit 17 grasps the residue of an usable fuel integrative displays the setting screen for power-source management as shown in drawing 5 on LCD141 according to a demand of a user. This setting screen displays the current busy condition of each fuel tanks 18, 22a, and 22b first.

[0040]

a1-a3 will display the residue with a bar graph, if fuel tanks 18, 22a, and 22b are expressed, respectively and the viewing area is clicked with a mouse 152. In the example of drawing 5, a1 is clicked and the residue of a fuel tank 18 is displayed. These a1-a3 also express the wearing existence of fuel tanks 18, 22a, and 22b, and the purport which has not equipped with fuel tank 22a is shown by the example of drawing 5. A microcomputer 21 detects the wearing existence of this fuel tank 21a, and it is notified to a microcomputer 171. The same is said of the wearing existence of fuel tank 21b. Moreover, a microcomputer 171 detects the wearing existence of a fuel tank 18. In addition, although the difference between wearing and un-equipping is expressed with the continuous line and the dotted line, you may express by not being restricted to this, for example, changing a foreground color here.

[0041]

moreover, b -- either of the fuel tanks 18, 22a, and 22b -- DMFC -- a unit -- it means whether the fuel is supplied to the DMFC cel stack 172 of 17, and the purport to which the fuel is supplied from the fuel tank 18 is shown by the example of drawing 5. And c1-c3 are for switching the fuel tank to be used, and if the viewing area of c3 is clicked with a mouse 152 by this condition, a power-source management utility directs the purport which changes a fuel tank in use from a fuel tank 18 to fuel tank 22b for the power-source controller 16. These directions will be further transmitted to the microcomputer 21 of the external fuel tank unit 2 from a microcomputer 171 from the power-source controller 16 at the microcomputer 171 of the DMFC unit 17, and the fuel of fuel tank 22b will begin to be supplied to the DMFC cel stack 172 of the DMFC unit 17. Moreover, in connection with this, a power-source management utility updates the display gestalt, as b shows the condition after a switch.

[0042]

Moreover, a power-source management utility displays the setting screen for power-source management as shown in drawing 6 on LCD141 according to a demand of a user. On this setting screen, it is possible to perform a setup of the use sequence of a fuel tank and a setup of the output level of the DMFC unit 17. d is an input area which specifies the use sequence of fuel tanks 18, 22a, and 22b, and the purport used for the priority

of fuel tank 22b, a fuel tank 18, and fuel tank 22a is set up in the example of drawing 6 . Moreover, e is an indicator for making the change while displaying the current output level of the DMFC unit 17. It is possible to make the output level go up and down by the purport to which the DMFC unit 17 is working being shown on the level 3 in four level by the example of drawing 6 , and clicking the viewing area with a mouse 152.

[0043]

Drawing 7 is a flow chart which shows the operations sequence of the power control performed by this electronic equipment 1.

[0044]

A power-source management utility carries out a screen display of the busy condition of each fuel tank to LCD141 according to a demand of a user (step A1). On this display screen, if the residue display demand of one of fuel tanks is performed (YES of step A2), a power-source management utility will acquire and display the residue information on that fuel tank (step A3). Moreover, if the change demand of a fuel tank is performed (YES of step A4), a power-source management utility will perform a switch of the fuel tank to be used (step A5).

[0045]

The above processing will end a screen display to LCD141, if it is repeated until the directions which close a screen are performed, and the directions are performed (YES of step A6).

[0046]

Thus, this electronic equipment 1 makes possible that thing [that sometimes come out and only a required part attaches a fuel] by being able to inhibit the increment in the volume of the body in the case of building in the DMFC unit 17, and enabling it to equip the fuel tank unit 2 with fuel tanks 22a and 22b free [pulling out] by having enabled external connection of the fuel tank unit 2 if needed.

[0047]

in addition, the invention in this application is not limited to said operation gestalt, and in the range which does not deviate from the summary, many things are boiled and it can be deformed at an execution phase Furthermore, invention of various phases is included in said operation gestalt, and various invention may be extracted by the proper combination in two or more requirements for a configuration indicated. For example, even if some requirements for a configuration are deleted from all the requirements for a configuration shown in an operation gestalt, the technical problem stated in the column of Object of the Invention is solvable, and when the effectiveness stated in the column of an effect of the invention is acquired, the configuration from which this requirement for a configuration was deleted may be extracted as invention.

[0048]

[Effect of the Invention]

As explained above, according to this invention, the power control approach of this device of performing various setup about use of the fuel tank unit and two or more fuel tanks which can connect the fuel tank unit which stored the fuel to the electronic equipment in which external connection is possible, and this device can be offered.

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the appearance of the electronic equipment concerning the operation gestalt of this invention.

[Drawing 2] Drawing showing the application of the mounting arrangement of the external fuel tank unit of the electronic equipment concerning this operation gestalt.

[Drawing 3] Drawing showing the electronic equipment of this operation gestalt, and the outline configuration of an external fuel tank unit.

[Drawing 4] Drawing showing the application of the electronic equipment of this operation gestalt, and the liquid-sending path of the fuel of an external fuel tank unit.

[Drawing 5] Drawing 1 showing an example of the setting screen for power-source management which the power-source management utility which operates by the electronic equipment of this operation gestalt displays.

[Drawing 6] Drawing 2 showing an example of the setting screen for power-source management which the power-source management utility which operates by the electronic equipment of this operation gestalt displays.

[Drawing 7] The flow chart which shows the operations sequence of the power control which the electronic equipment of this operation gestalt performs.

[Description of Notations]

1 [-- RAM,] -- Electronic equipment, 2 -- A fuel cell unit, 11 -- CPU, 12 13 -- HDD, 14 -- A display controller, 15 -- Keyboard controller, 16 -- A power-source controller, 17 -- A DMFC unit, 18 -- Fuel tank, 19 -- An attachment (connection), 21 -- The microcomputer for external fuel tank units, 22a, 22b -- A fuel tank, 141 -- LCD, 151 -- Keyboard, 152 [-- A DMFC cel stack 173 / -- A rechargeable battery, 174 / -- A DC to DC converter, 181 / -- E2PROM, 221 / -- E2PROM.] -- A mouse, 161 -- A setting register, 171 -- A microcomputer with a built-in fuel cell unit, 172

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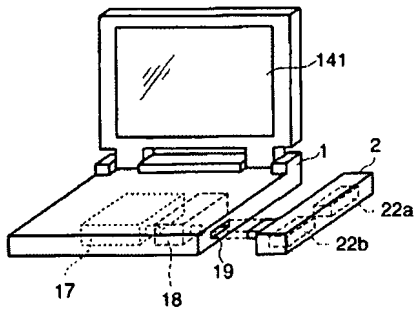
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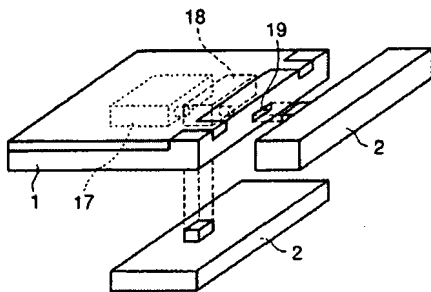
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DRAWINGS

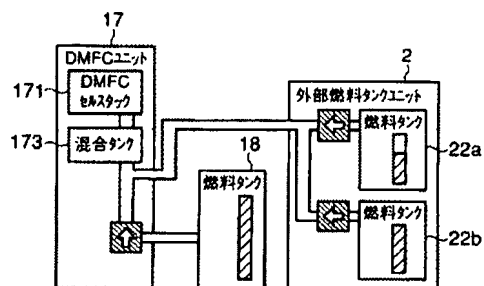
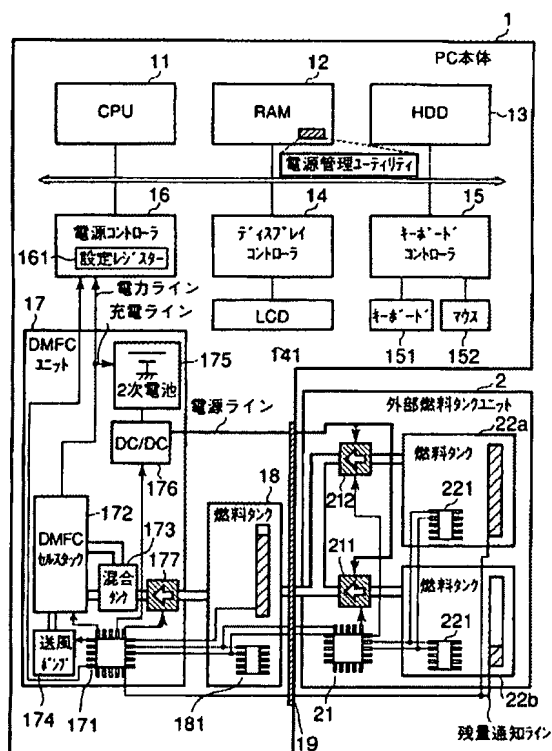
[Drawing 1]

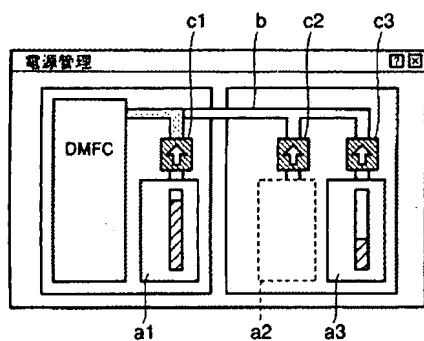


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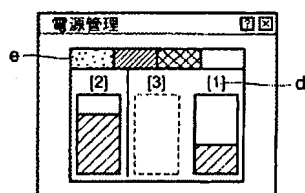


[Drawing 3]

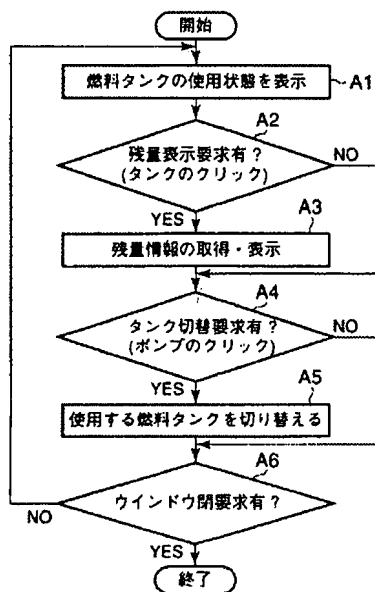




[Drawing 6]



[Drawing 7]



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